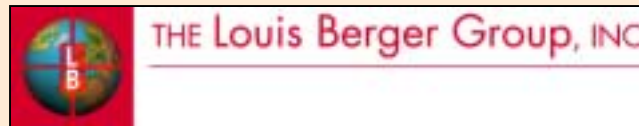


**Segment 2204 of the Petronila Creek
Chloride, Sulfate, Total Dissolved Solids
Total Maximum Daily Load Development**

Robstown, Texas

**Meeting #1
December 9, 2003**



Objectives

- To explain the TMDLs: What is? Why? Which segment? How?
- To present and review the steps and the data used in the development of the TMDL for the listed segment 2204 of the Petronila Creek.

Why Develop TMDLs?

Requirements of 1972 Clean Water Act:

- States are required to identify impaired waters
- Section 303(d) of the Clean Water Act:
 - Requires states to periodically list impaired waters
 - Requires TMDLs development for impaired waters

EPA in litigation for failure to promulgate Section 303(d) of the Clean Water Act.

What is a TMDL?

- A TMDL (Total Maximum Daily Load) establishes the maximum amount of an impairing substance or stressor that a waterbody can assimilate and still meet Water Quality Standards and allocates that load among pollution contributors.
- TMDLs are a tool for implementing State water quality standards. They are based on the relationship between pollution sources and in-stream water quality conditions.
- A TMDL addresses a single pollutant or stressor for each waterbody.

Which Waterbodies Require TMDLs?

Waterbodies require TMDLs when the pollution control requirements are not stringent enough to meet applicable Water Quality Standards.

How are TMDLs Calculated?

- A TMDL is the sum of the allowed pollutant loads for point sources, non-point sources, a margin of safety, and projected growth.
- $\text{TMDL} = \text{Point Sources} + \text{Nonpoint Sources} + \text{Margin of Safety}$

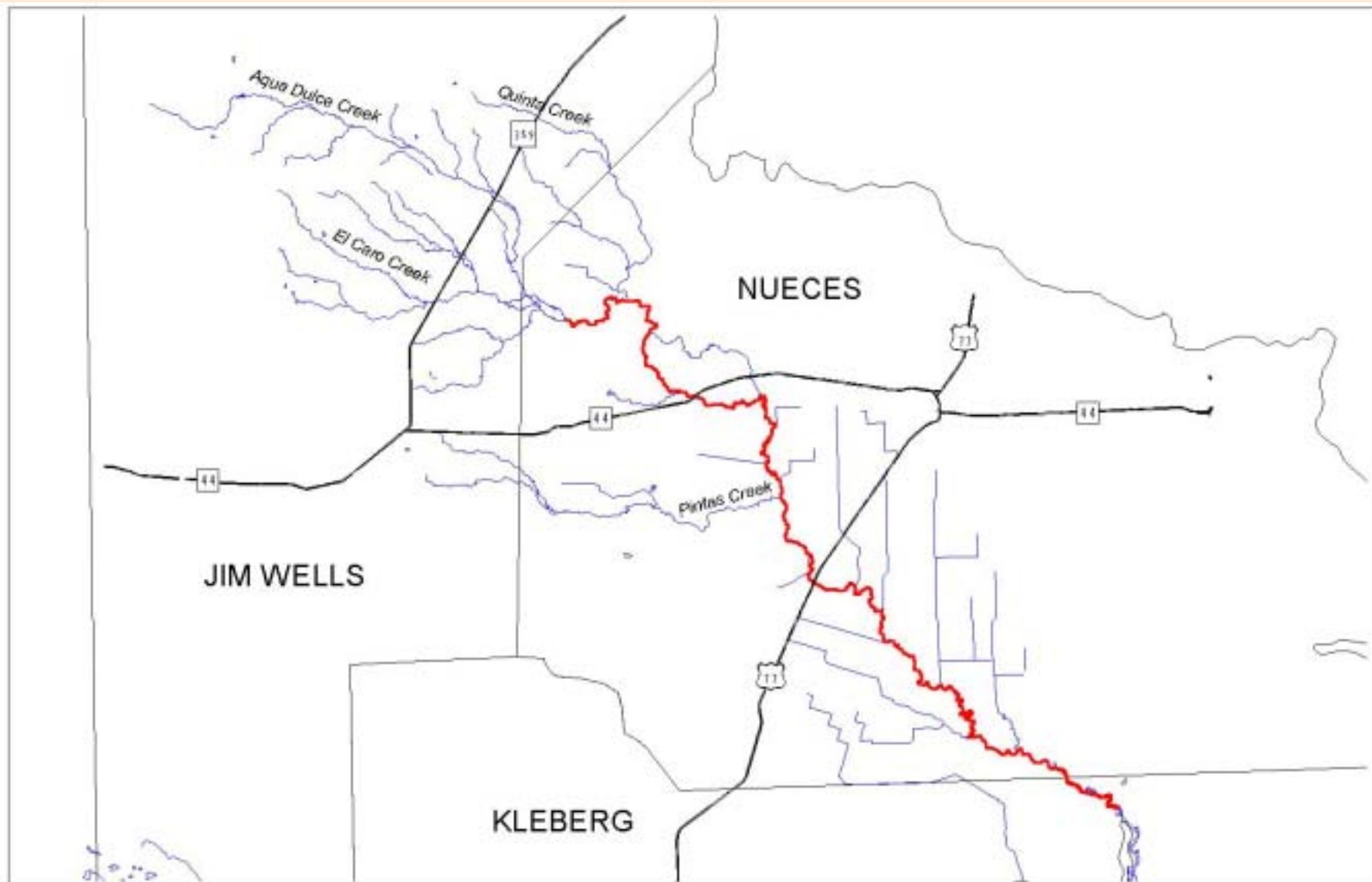
TX Water Quality Standards

- Chloride, Sulfate, Total Dissolved Solids Impairment
- Appendix A: Water Uses and Numeric Criteria
 - Chloride = 1,500 mg/L
 - Sulfate = 500 mg/L
 - Total Dissolved Solids = 4,000 mg/L

What is a TMDL?

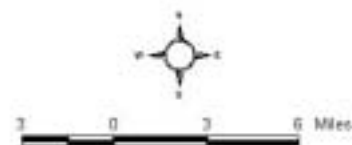
A Special Study to:

- Identify the sources of pollution contributing to violation of water quality standards.
- Calculate the amount of pollutant loads entering the stream from each source.
- Calculate the reductions in pollutant loads, by source, needed to attain/maintain the water quality standards.
- Must include a margin of safety.



- Major Roads
- Petronila Creek Listed Segment
- Tributaries HUC 12110285
- County Boundaries

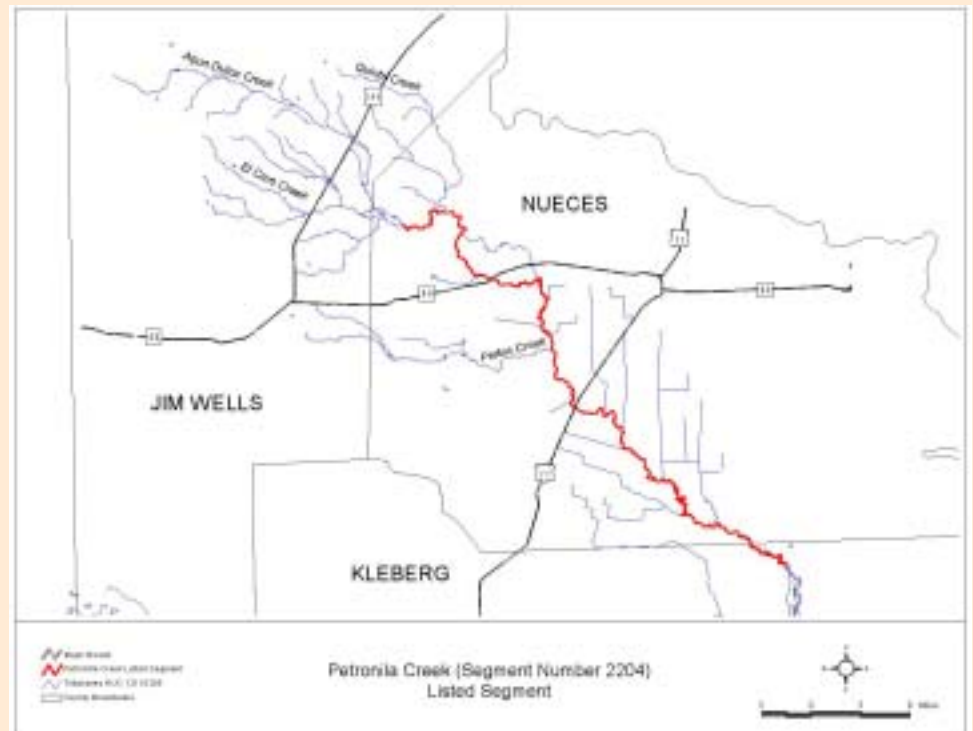
Petronila Creek (Segment Number 2204)
Listed Segment



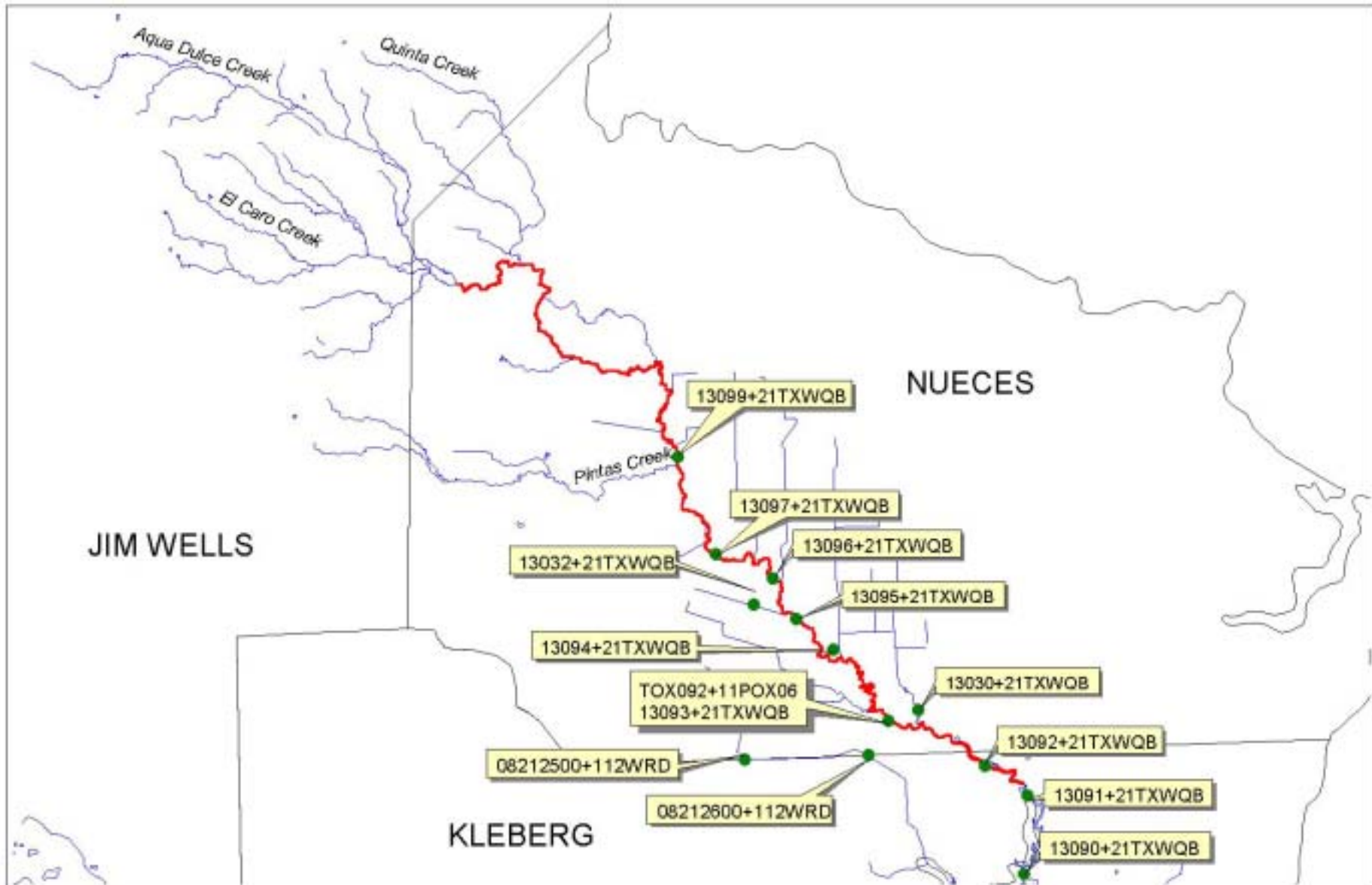
Petronila Creek Listed Segment

Based on the 2000 303(d) List

- **Upstream Limit:**
 - Confluence of Aqua Dulce and Banquete Creeks.
- **Downstream Limit:**
 - A point 0.6 miles upstream of private road crossing near the Laureles Ranch in Kleberg County.
- **Segment Length:**
 - 44 miles



Environmental Monitoring



Petronila Creek (Segment Number 2204)
Water Quality Monitoring Stations

- Water Quality Stations
- Petronila Creek Listed Segment
- Tributaries HUC 12110265
- County Boundaries



3 0 3 6 Miles

Summary of Water Quality Conditions: Chloride

Station	Period of Record	# of Samples	No. of violations	Percent of time exceed the standard
13094	May 95- Oct 03	30	26	86.7
13096	Oct 95 - Oct 03	10	8	80.0
13030	Jan 03 - Oct 03	6	4	66.7
13032	Jan 03 - Oct 03	5	3	60.0
13093	Jan 03 - Oct 03	6	4	66.7
13095	Jan 03 - Oct 03	6	4	66.7
13098	May 03 - Oct 03	4	1	25.0
13099	Jan 03 - Oct 03	4	1	25.0
14944	Oct 95 - Jun 96	4	0	0.0
17658	Aug-03	2	0	0.0
17659	Aug-03	2	0	0.0
17660	Aug-03	2	0	0.0

Summary of Water Quality Conditions: Sulfate

Station	Period of Record	# of Samples	No. of violations	Percent of time exceed the standard
13094	May 95 - Oct 03	30	14	46.7
13096	Jan 96 - Oct 03	10	6	60.0
13030	Jan 03 - Oct 03	6	4	66.7
13032	Jan 03 - Oct 03	5	3	60.0
13093	Jan 03 - Oct 03	6	4	66.7
13095	Jan 03 - Oct 03	6	4	66.7
13098	May 03 - Oct 03	4	1	25.0
13099	Jan 03 - Oct 03	4	1	25.0
14944	Oct 95 - Jun 96	4	0	0.0
17658	Aug-03	2	0	0.0
17659	Aug-03	2	0	0.0
17660	Aug-03	2	0	0.0

Summary of Water Quality Conditions: TDS

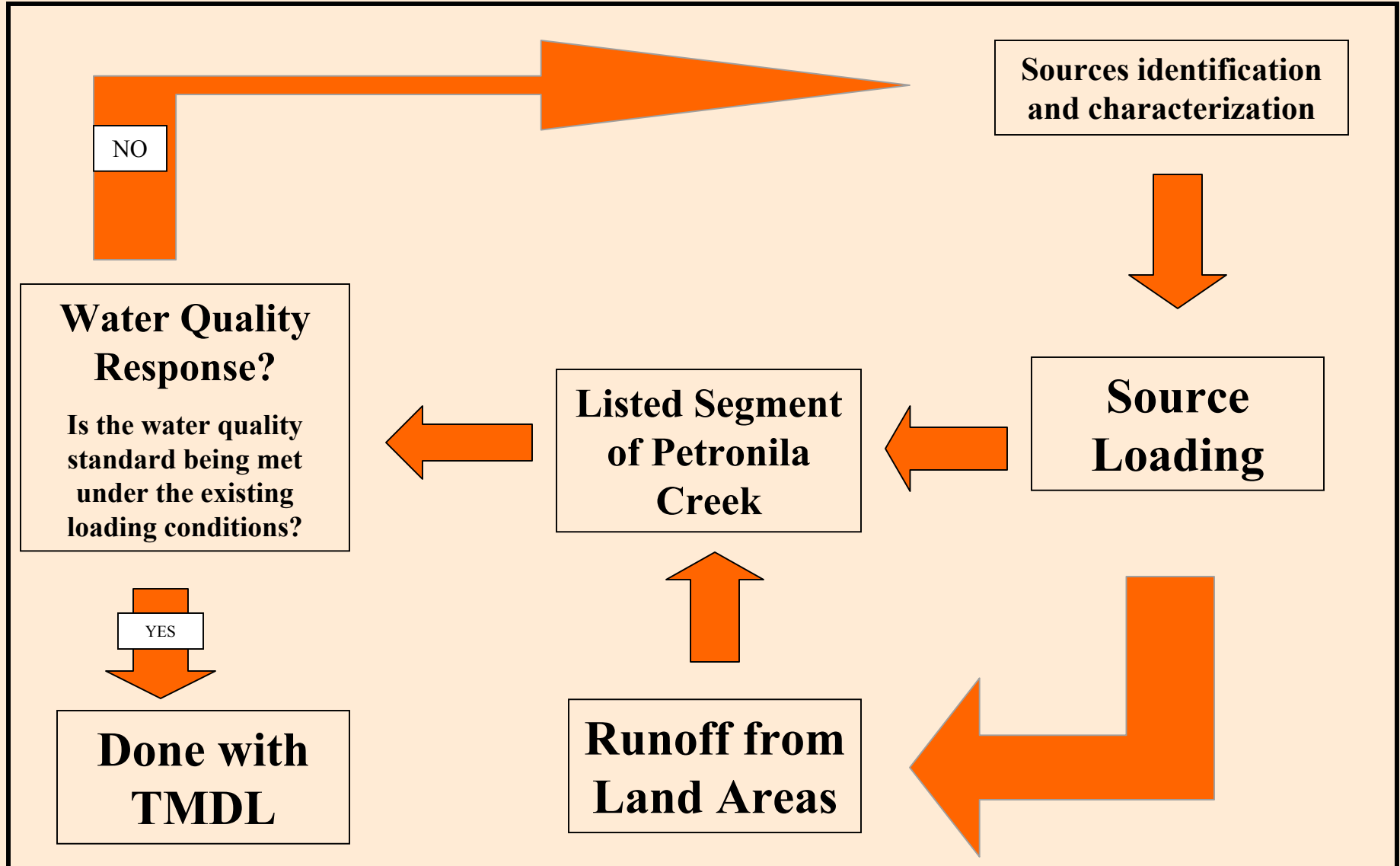
Station	Period of Record	No. of Samples	No. of violations	Percent of time exceed the standard
13094	Apr 94 - Oct 03	33	27	81.8
13096	Oct 95 - Oct 03	10	8	80.0
13030	Jan 03 - Oct 03	6	4	66.7
13032	Jan 03 - Oct 03	5	3	60.0
13093	Jan 03 - Oct 03	6	4	66.7
13095	Jan 03 - Oct 03	6	4	66.7
13098	May 03 - Oct 03	4	1	25.0
13099	Nov 97 - Oct 03	7	1	14.3
17658	Aug-03	2	0	0.0
17659	Aug-03	2	0	0.0
17660	Aug-03	2	0	0.0

TMDL Process

TMDL Development Process

1. Define the problem
2. Define the numeric targets for the pollutant
3. Identify and characterize pollutant sources
4. Estimate loadings under the existing conditions
5. Evaluate the linkage between the pollutant sources and instream response
6. Develop allocation scenarios that meet the water quality standards
7. Develop a follow up monitoring plan
8. Develop an implementation plan

TMDL Process



Data and Information Needs...

- Watershed Physiographic data
- Hydrographic data
- Weather data
- Watershed activities/use data and information related to **pollutant** production
- Point sources and direct discharge data and information
- Environmental Monitoring data
- Stream Flow data

Data Inventory

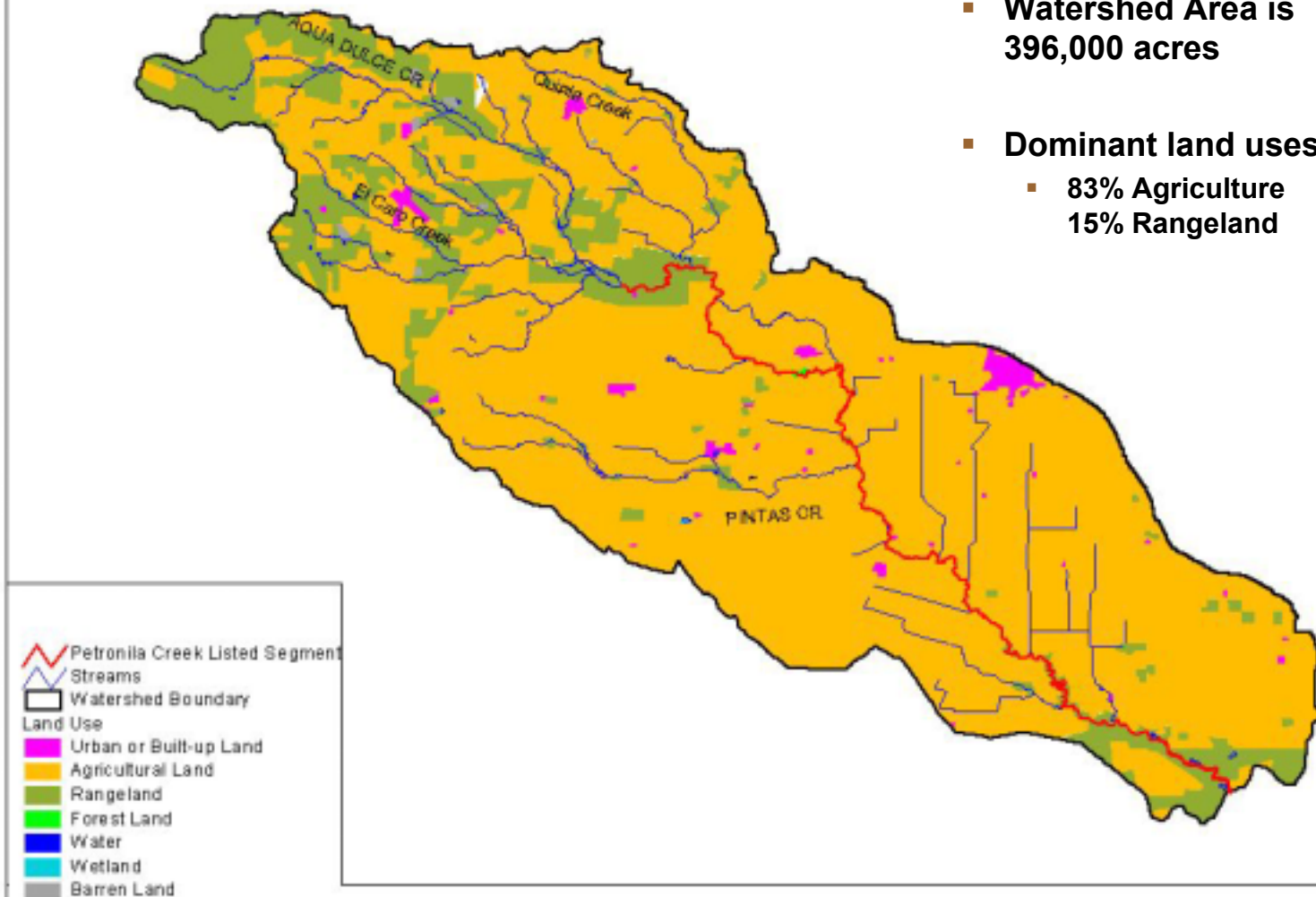
Data Category	Description	Potential Source(s)
Watershed physiographic data	Watershed boundary	USGS, TCEQ
	Land use/land cover	BASINS, MRLC, NLCD, TCEQ
	Soil data (SSURGO, STATSGO)	USDA, NRCS
	Topographic data (USGS-30 meter DEM, USGS Quads)	USGS, TCEQ
Hydrographic data	1. Stream network and reaches (RF3)	BASINS, TCEQ, Field determination
	2. Stream channel morphology	
Weather data	Hourly meteorological conditions	NOAA NCDC, Earth Info, local airports, weather stations, and colleges and universities
Watershed activities/ uses data and information related to pollutant Production	Compile information, data, reports, and maps that can be used to support CL, TDS and Sulfate source identification and loading. Address the following issues:	TCEQ, River Authorities, TSSWCB, RRC, and other State, County and Local agencies
	▪ Leaking oil wells	
	▪ Brine Pits	
	▪ Brine injection	
	▪ Phreatophytic Brush	
	▪ Salt deposits (geological source)	
Point sources and direct discharge data and information	Permitted facilities locations and discharge monitoring reports (DMR)	US EPA Permit Compliance System (PCS), TCEQ
Environmental monitoring data	Station locations and ambient instream monitoring data	TCEQ, Monitoring Plan, River Authorities
Stream flow data	Gaging station location and continuous flow data	USGS, TCEQ, River Authorities

Watershed Physiographic Data:

Description	Potential Source(s)
Watershed boundary	USGS, TCEQ
Land use/land cover	USGS, TCEQ
Soil data (SSURGO, STATSGO)	USDA, NRCS
Topographic data (USGS-30 meter DEM, USGS Quads)	USGS

Petronila Creek 2204

- Watershed Area is 396,000 acres
- Dominant land uses
 - 83% Agriculture
 - 15% Rangeland



1 0 1 2 3 4 5 6 7 8 9 10 Miles



Petronila Creek (Segment Number 2204)
Land Use/Land Cover



Segment 2204 Land Use Data

Land Use		Acres	Percent	Total Percent
Urban	RESIDENTIAL	2,094	0.5	1.2
	COMMERCIAL AND SERVICES	614	0.2	
	INDUSTRIAL	734	0.2	
	TRANS, COMM, UTIL	663	0.2	
	MXD URBAN OR BUILT-UP	540	0.1	
	OTHER URBAN OR BUILT-UP	64	0.0	
Agricultural	CROPLAND AND PASTURE	329,048	83.0	83.1
	CONFINED FEEDING OPS	45	0.0	
	OTHER AGRICULTURAL LAND	503	0.1	
Rangeland	HERBACEOUS RANGELAND	13,704	3.5	15.4
	SHRUB & BRUSH RANGELAND	31,338	7.9	
	MIXED RANGELAND	16,100	4.1	
Forest	DECIDUOUS FOREST LAND	111	0.03	0.03
	EVERGREEN FOREST LAND	1	0.00	
Water	LAKES	19	0.00	0.0
	RESERVOIRS	22	0.01	
Wetland	NONFORESTED WETLAND	52	0.01	0.01
Barren	STRIP MINES	768	0.2	0.2
	Total	396,419	100.0	100

Hydrographic data:

Description	Potential Source(s)
Stream network and reaches (RF3)	BASINS, NHD, TCEQ
Stream Channel Morphology	Field Survey



- Petronile Creek Listed Segment
- Streams
- Watershed Boundary
- Subwatersheds
- Counties

**Petronila Creek (Segment Number 2204)
Subwatersheds**



Weather data:

Description	Potential Source(s)
Hourly meteorological conditions	NOAA NCDC, Earth Info, local airports and weather stations.

Watershed activities/uses data and information related to Chloride and Sulfate production:

Compile information, data, reports, and maps that can be used to support the source identification and loading.

Address the pollutant loading from the following:

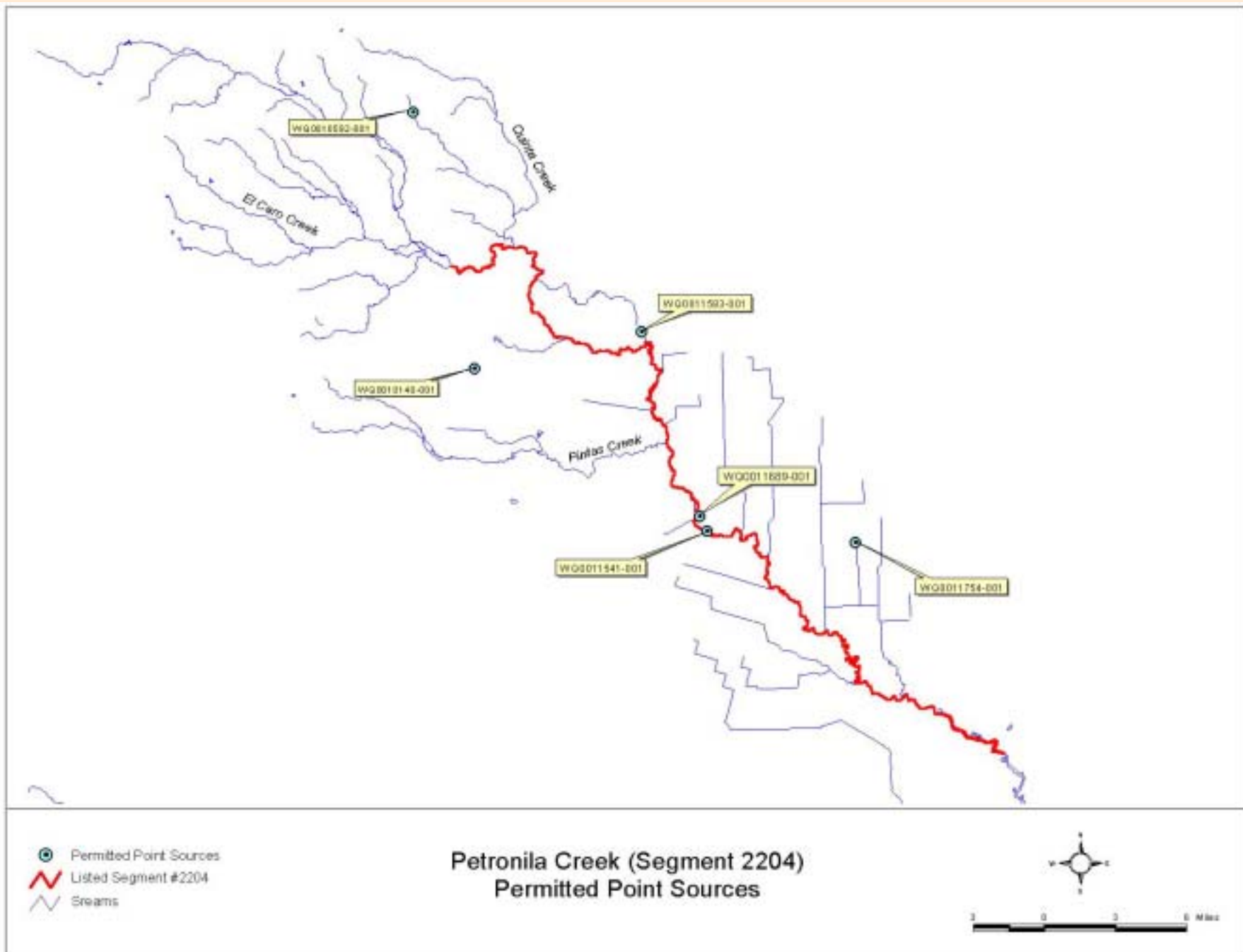
- Human Sources
 - Permitted Sources (facilities, brine pits and injection, leaking wells)
- Natural Sources
 - Geologic Formations
 - Biological Sources

Potential Sources Characterization

Source	Receiving Water				Response
	Surface Water		Groundwater		
	Direct	Indirect	Shallow	Deep	
Permitted Point source	X				F
Brine Pit		X			F
			X		M
Leaking oil well			X		M
Brine Injection			X		M
				X	S
Phreatophytic Brush		X	X		M
Salt Deposits		X	X		M

Point sources and direct discharge data and information:

Description	Potential Source(s)
Permitted facilities locations and discharge monitoring reports (DMR)	US EPA Permit Compliance System (PCS), Texas Pollutant Discharge Elimination System (TPDES), TCEQ

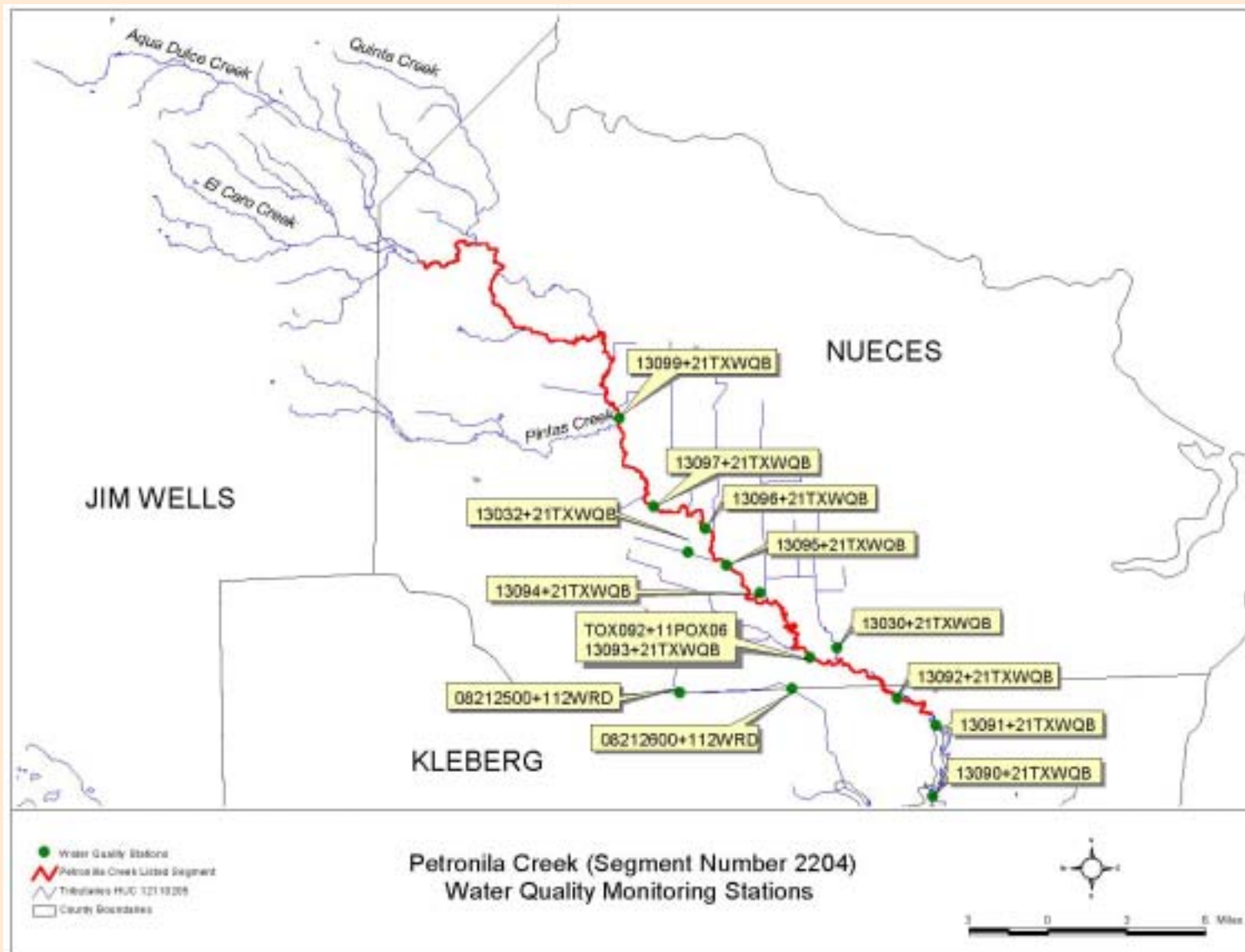


Environmental monitoring data:

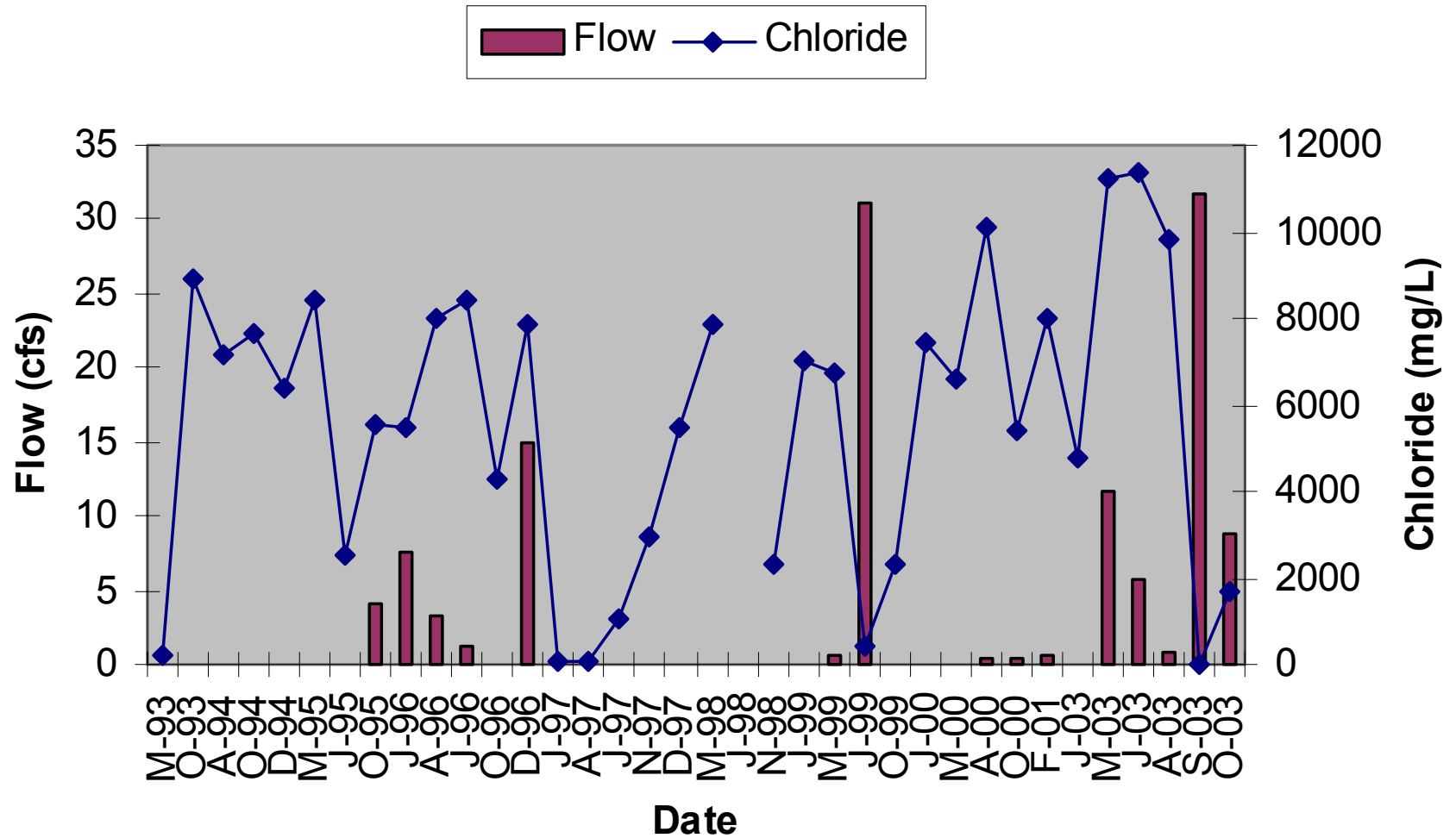
Description	Potential Source(s)
Station locations and ambient instream monitoring data	TCEQ
	TCEQ
Special Studies	Colleges and universities, Local project surveys, Local knowledge based on communications with local groups and stakeholders

Water Quality Data Analysis

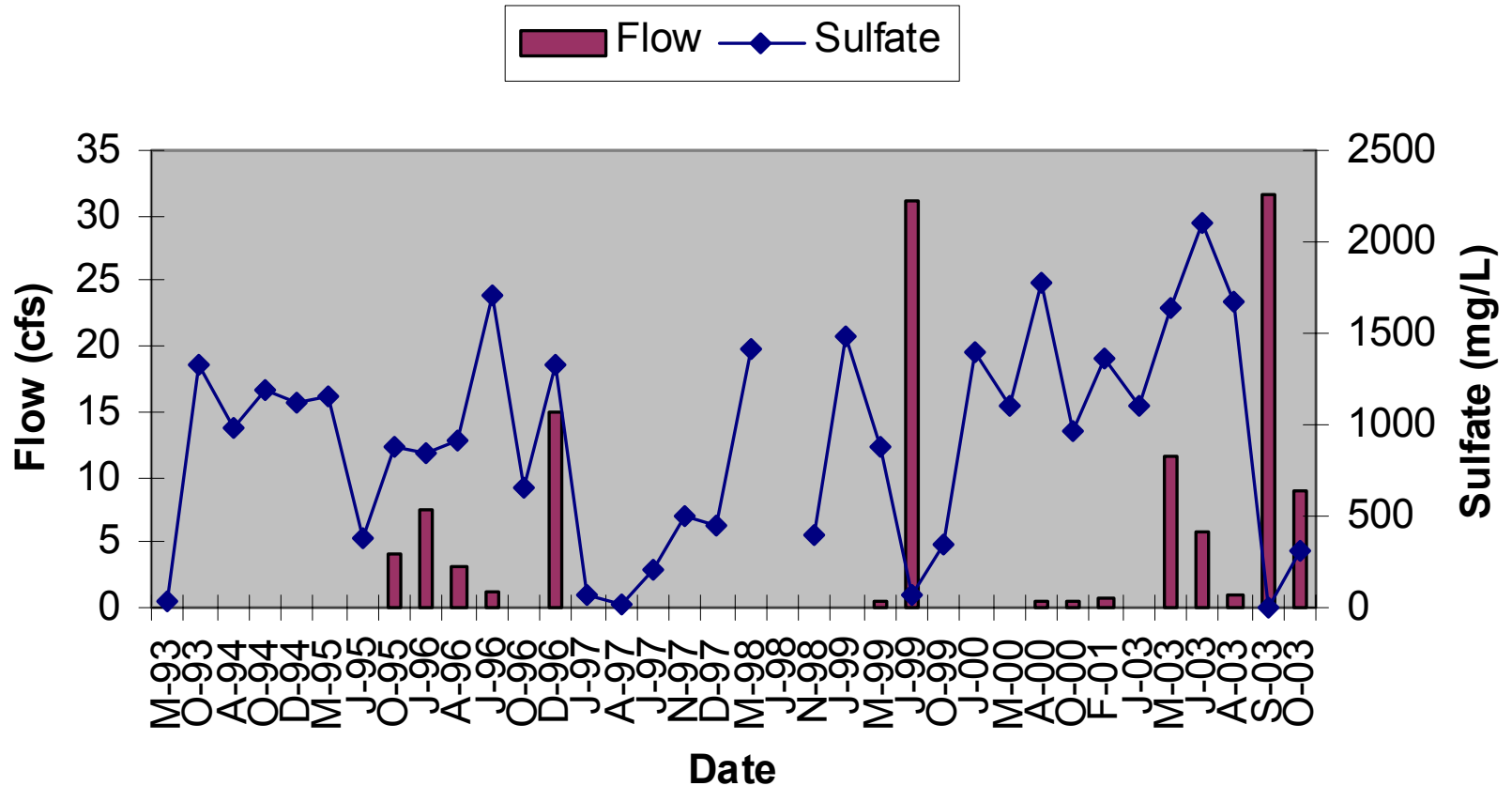
- Locations of sources and WQ Stations
- Data Analysis
 - Flow and pollutants relations and trends



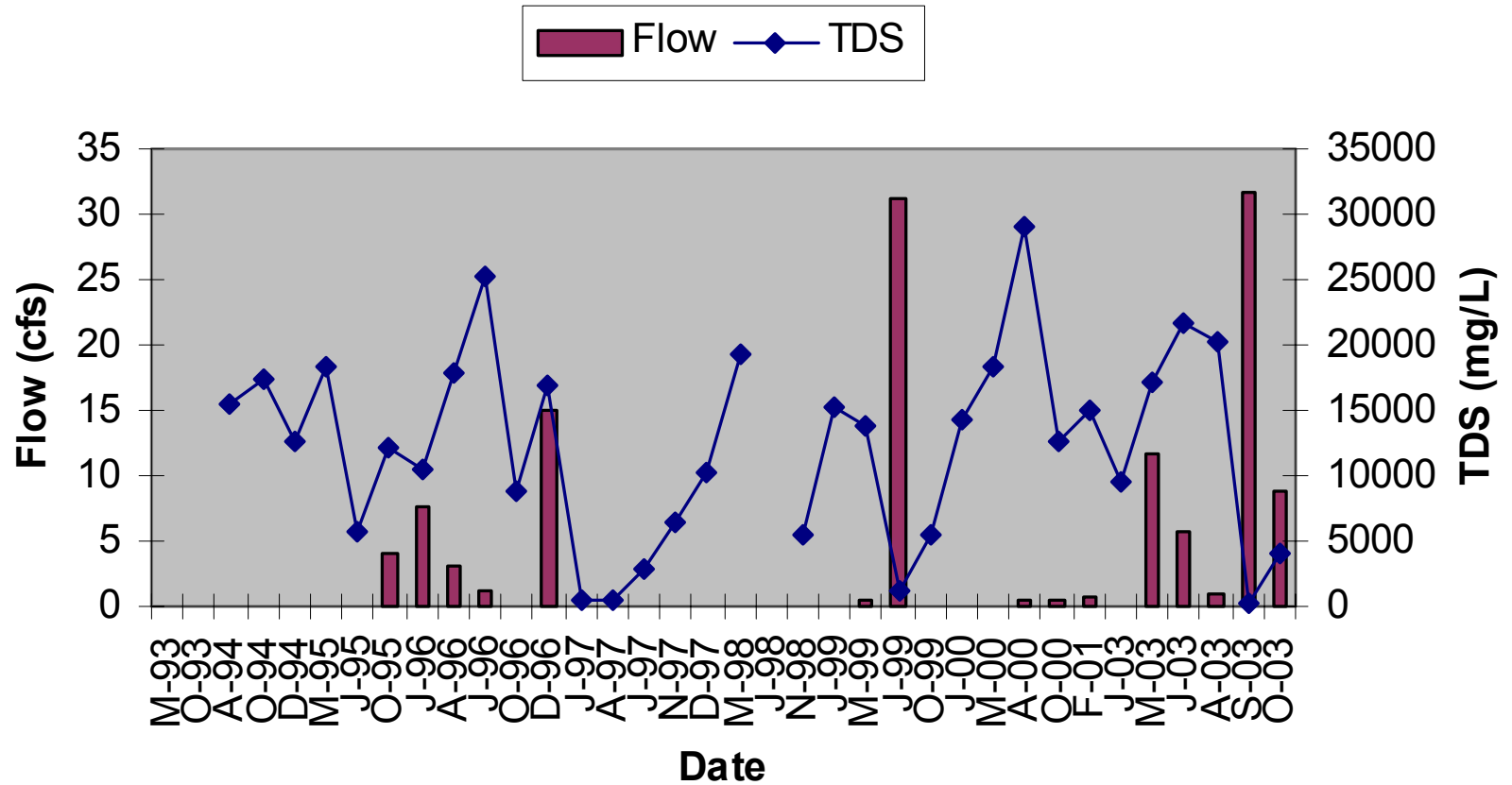
Petronila Creek: Station 13094



Petronila Creek: Station 13094

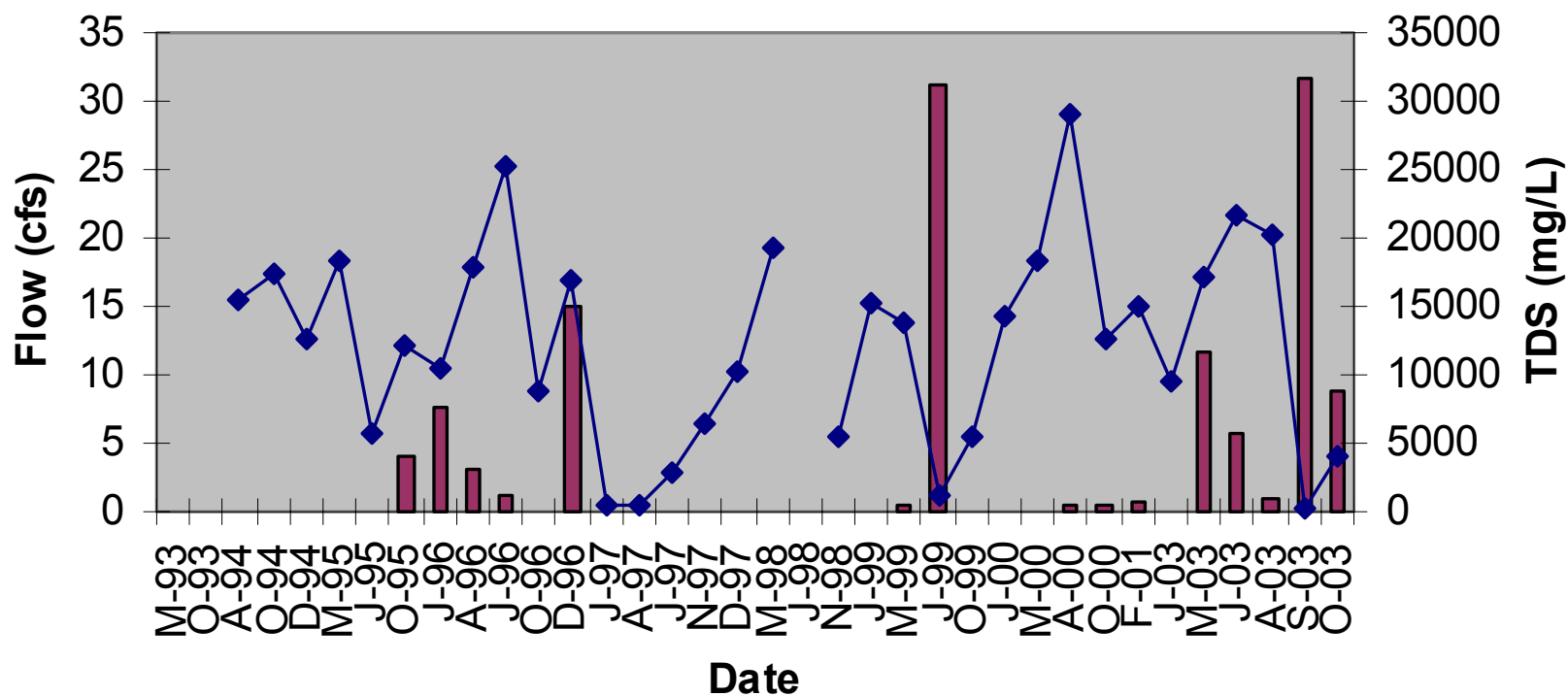


Petronila Creek: Station 13094

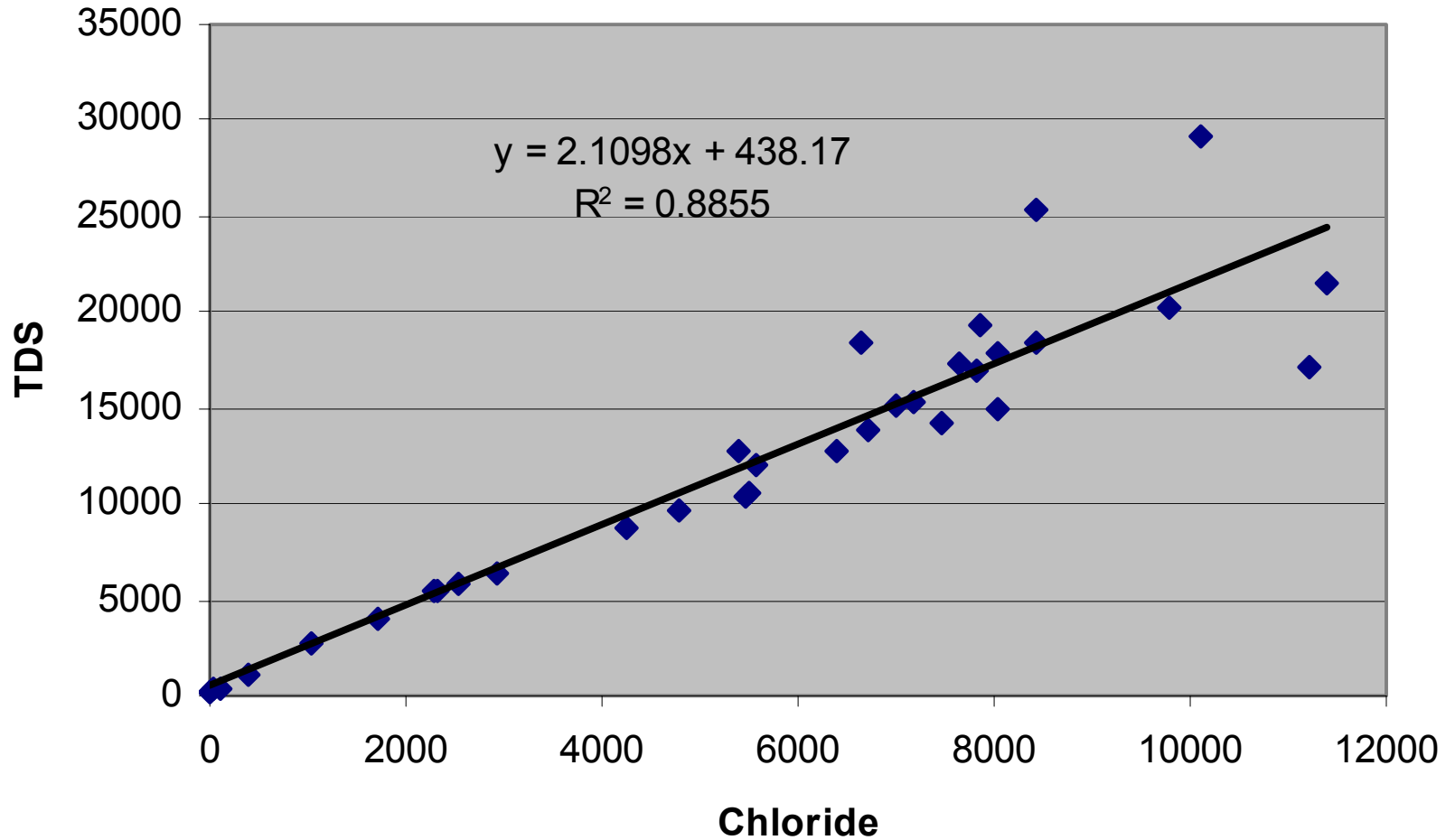


Petronila Creek: Station 13094

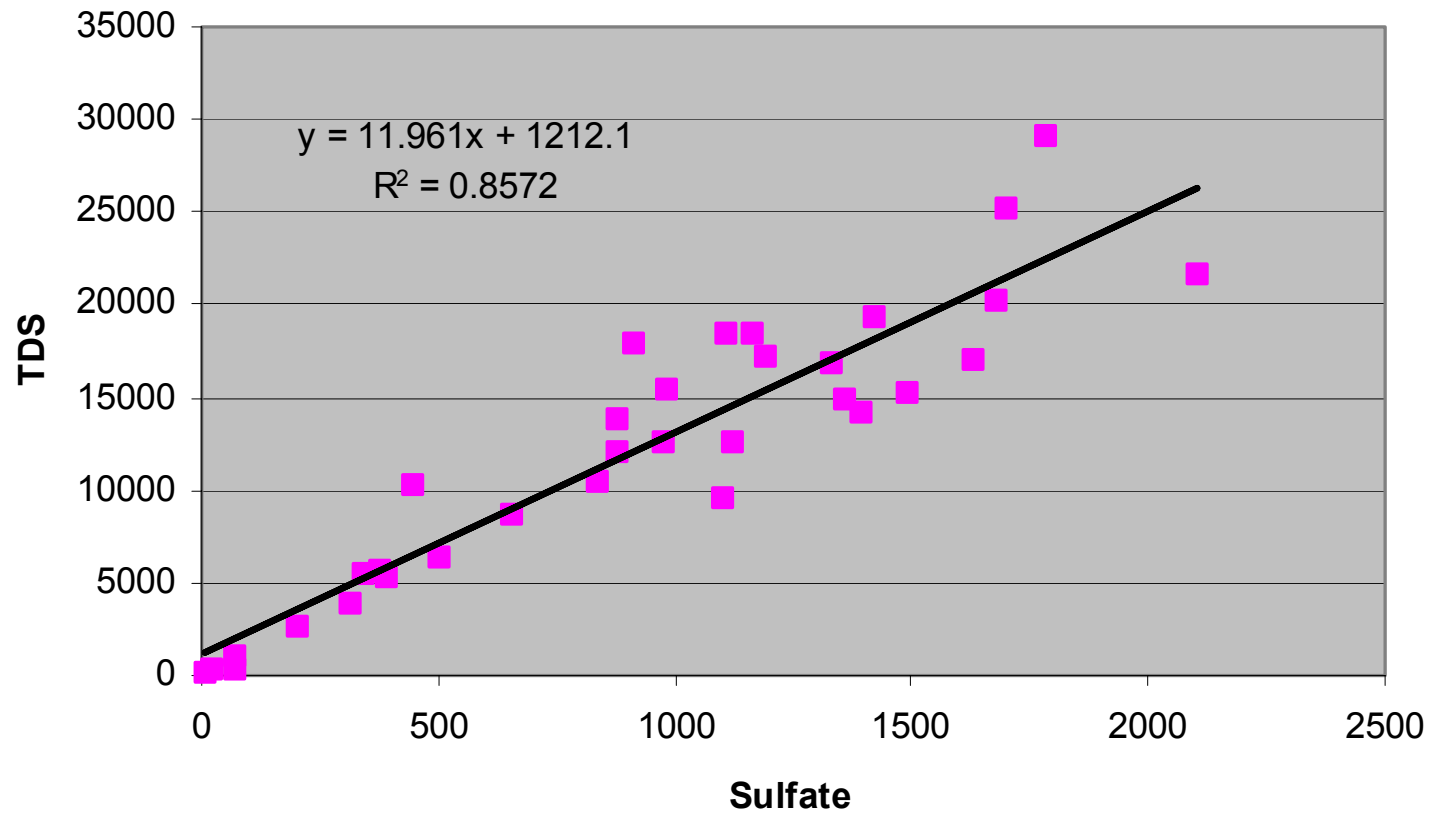
Flow TDS



Petronila Creek: Station 13094

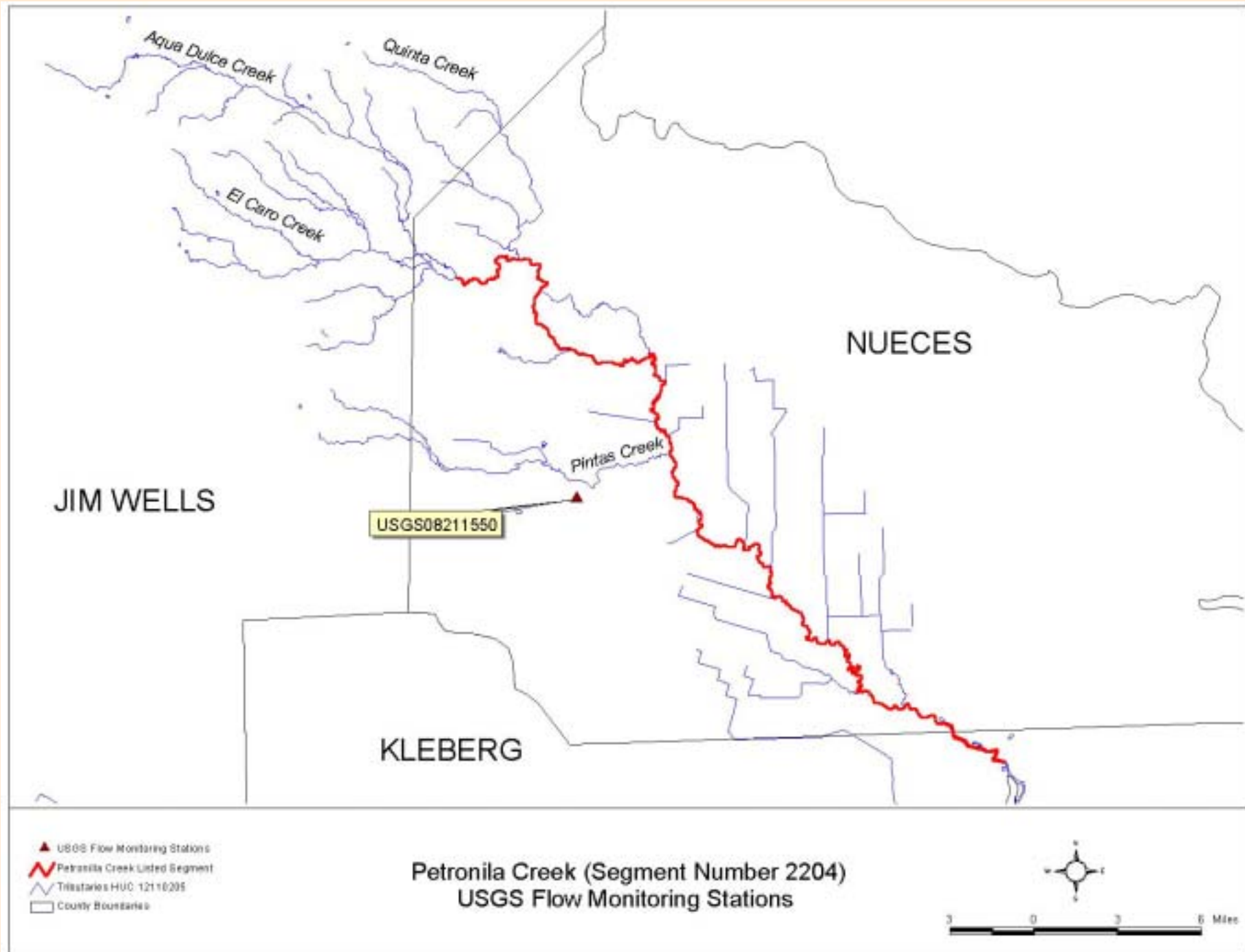


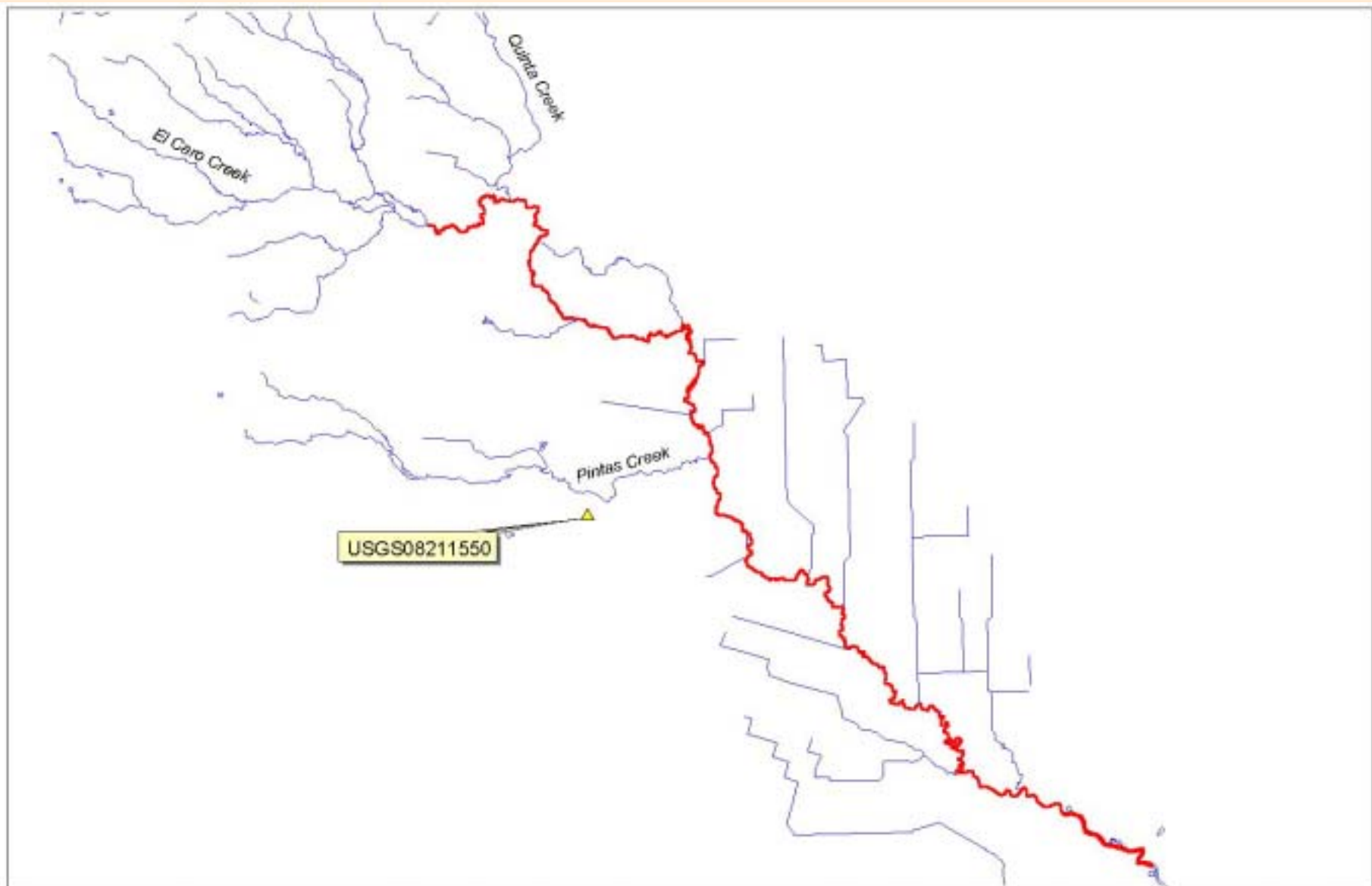
Petronila Creek: Station 13094






Stream flow data:

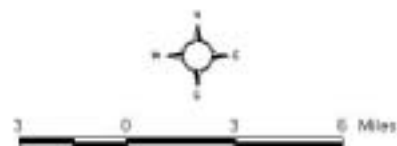
Description	Potential Source(s)
Gaging station location and continuous flow data	USGS, TCEQ





-  Flow Monitoring Stations
-  Listed Segment #2204
-  Streams

Petronila Creek (Segment Number 2204)
Proposed Flow Monitoring Stations



Source Loading Estimates

"Total Available Load"

Sources Loading Estimates

- Determine the daily pollutant production by source
- Estimate the size/number of each source
- Determine whether the source is
 - Direct Source
 - Indirect Source
- Calculate the load to each land use based on a monthly schedule and for each source
- The sum of all the individual sources is the total load

Next Steps

- Identify data needs
- Collect available data
- Analyze data to investigate the impairment in the watershed
- Source loading estimates
- Develop the watershed model input parameters
- Prepare for the Public Meeting

Local TMDL Contacts

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